



Rejuvenation Instructions Power Cables IA (Injection Adaptor) Installation – Live-Front

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- Ultrinium[™] sustained pressure injection method (U.S. Patent 7,615,247)
- Ultrinium[™] formulation optimization injection method (U.S. Patent 7,611,748)
- Injection Adaptor (U.S. Patent 7,195,504 and 7,538,274)
- Perfectium[™] single switch injection (U.S. Patent 7,353,601)
- Predicting performance of Electrical Power cables (patent pending)
- Formulation of Ultrinium[™] & Perficio[™] components (patents pending)
- N-Rex[™] submarine cable injection process (patent pending)
- N-Ter[™] injection or Novinium thermally enhanced rejuvenation (patent pending)
- Reticular Flash Preventer (RFP) provides safer operation of conventional injection elbows (patent pending)

Version 20091120

Installing IAs – Live-front Applications

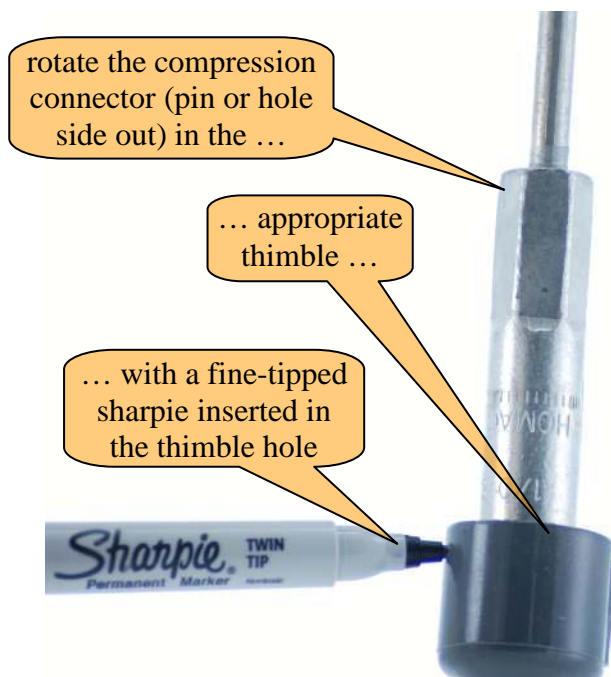


Caution: Working around energized high-voltage systems may cause serious injury or death. Installation should be performed by personnel familiar with good safety practice in handling high-voltage electrical equipment. De-energize, test and ground all electrical systems before installing Injection Adaptors.

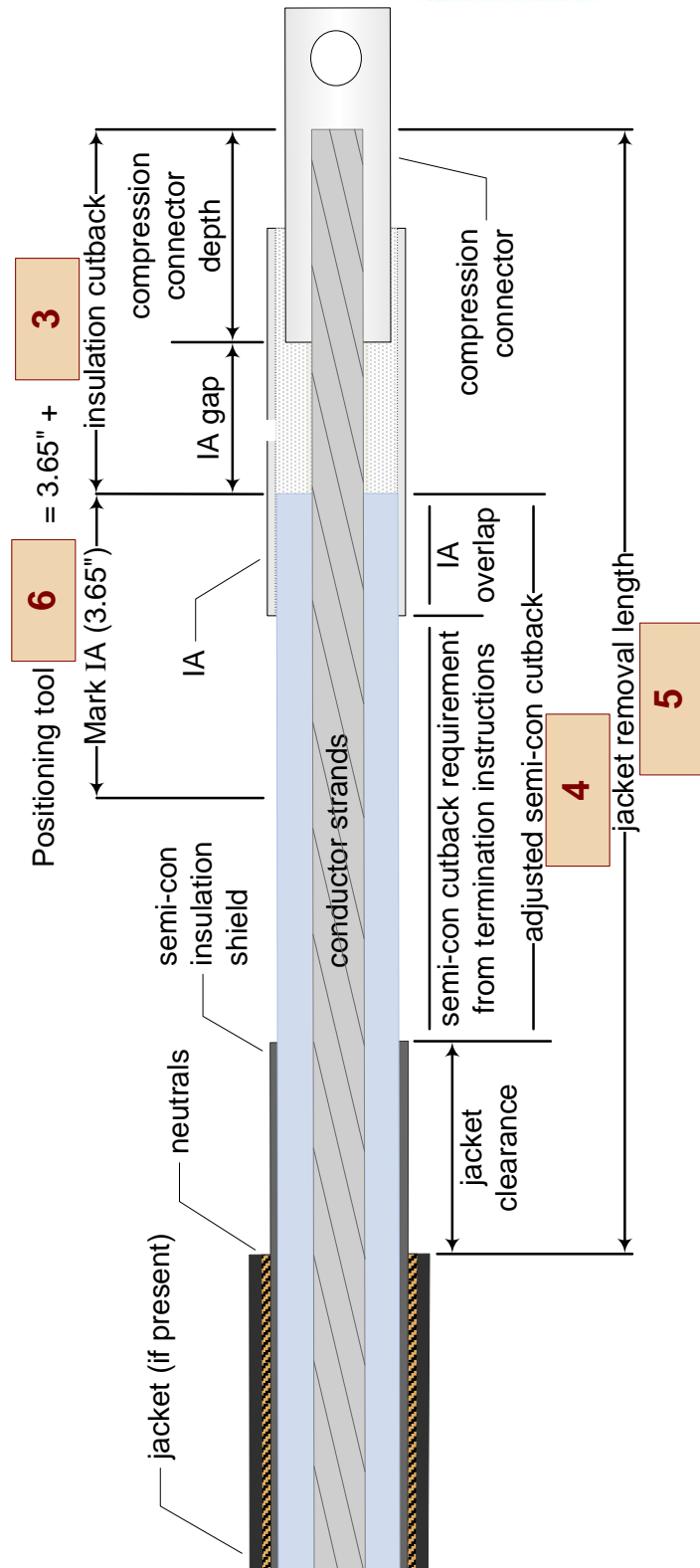
1. Measure the compression connector barrel depth to the end-of-hole at the hole edge utilizing the caliper central slide probe. Do not measure near the middle of the hole as the end of the hole is generally domed.



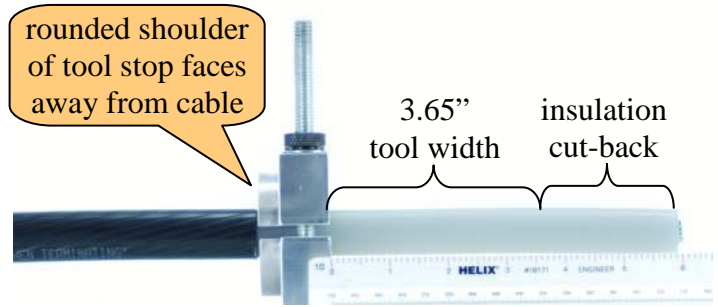
2. Draw a connector positioning line around the circumference of the connector. Place the compression connector (termination side out) in the appropriate 200-amp thimble (NPN:0-LT-THIM200ALF) or 600-amp thimble (NPN:0-LT-THIM600ALF). Use a fine-tipped permanent marker held square to the connector axis and inserted in the hole.



3. Add the compression connector depth measured in step 1 to the IA gap (found on the IA label) to calculate the insulation cutback. The IA gap includes an allowance for growth when the IA, compression connector, and strands are swaged. Record this value in box 3 on the nearby assembly drawing.
4. Add the semi-con insulation shield cutback requirement from the termination manufacturer's instructions to the IA overlap (found on the IA label) to calculate the adjusted semi-con cutback. The IA overlap includes an allowance for growth when the IA and insulation are swaged. Record this value on the nearby assembly drawing in box 4.
5. If the cable includes a jacket the jacket clearance from the termination manufacture's instructions should be added to the insulation cutback (box 3) and the adjusted semi-con cutback (box 4) to calculate the jacket removal length. Record this value on the nearby assembly drawing in box 5.
6. Add the insulation stripper (NPN:0-LT-STRIP) tool length, 3.65" (92.7 mm), to the value in box 3 and record the sum in box 6. This is the distance from the conductor end to the positioning tool shoulder face in step 7.



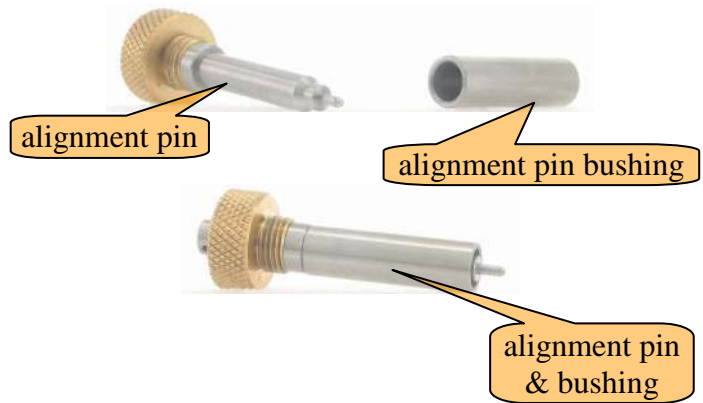
7. Position the flat face of the tool stop (NPN: 0-LT-TLSTP) precisely the distance calculated in step 6 and recorded in box 6. Snug the tool stop into position.



8. Insert the insulation end of the IA over the insulation until the insulation seats on the internal IA shoulder. There must be no interference between the insulation and the IA. If there is any interference the next larger size of IA is required, or the cable may be out-of-round and may need to be replaced. The positioning line drawn in a previous step should be flush with the end of the IA.

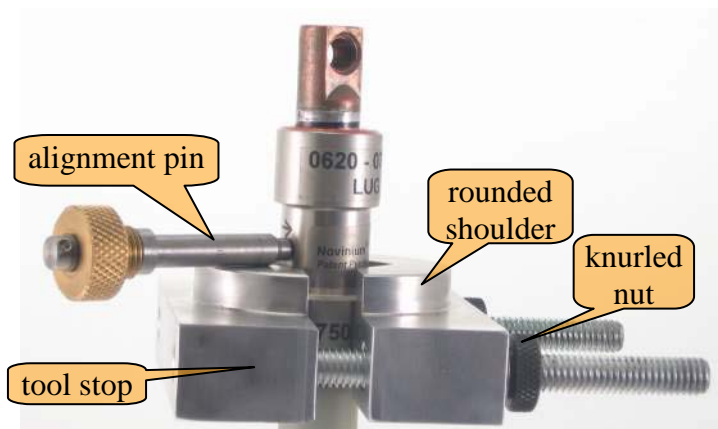


9. Loosely position the tool stop (NPN: 0-LT-TLSTP) with the rounded shoulder facing away from the cable insulation over the insulation compression portion of the IA.



- a. Except for IAs with part numbers which end with an “L”, slide the alignment pin bushing (NPN: 2-LT-ALBUSH) over the alignment pin (NPN: 2-IT-ITOOL/PIN) for accurate positioning in Step 9b.

- b. Insert the alignment pin into the injection port hole. Snug the rounded shoulder of the tool stop against the swage alignment pin and tighten the nuts. Remove the alignment pin.



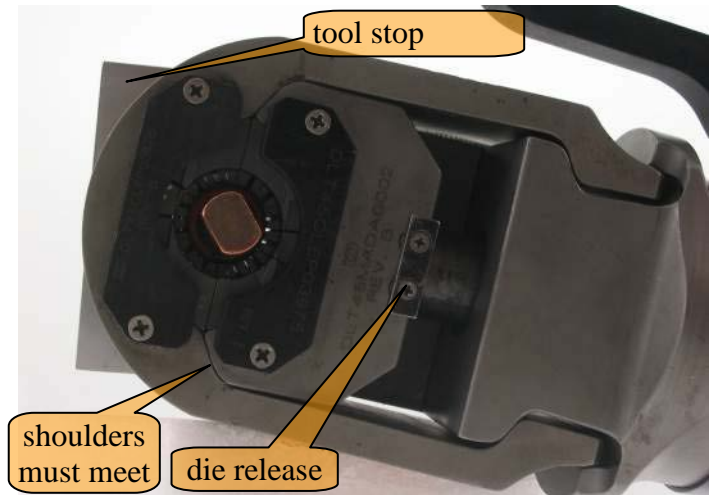
10. Position the compression connector over the conductor strand ends and inside the IA. The connector positioning line should be flush with the IA end.



11. Install the 4-digit die in the swaging tool that matches the 4-digit number on the connector side of the IA. This 4-digit number is the nominal outside diameter of the IA after it is swaged in mils. A mil is 1/1000th of an inch. In the example, die 0842 will swage to a nominal OD of 0.842".

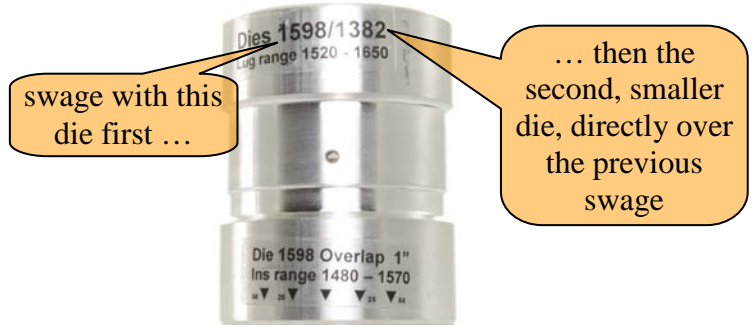


12. Swage the IA and compression connector ...
 - a. With the die release facing away from the tool stop, hold the swaging tool head snugly against the tool stop and swage the IA, compression connector (lug) and strands until the shoulders of the tool head meet. For IAs with quick disconnect fittings, avoid damaging the fitting.

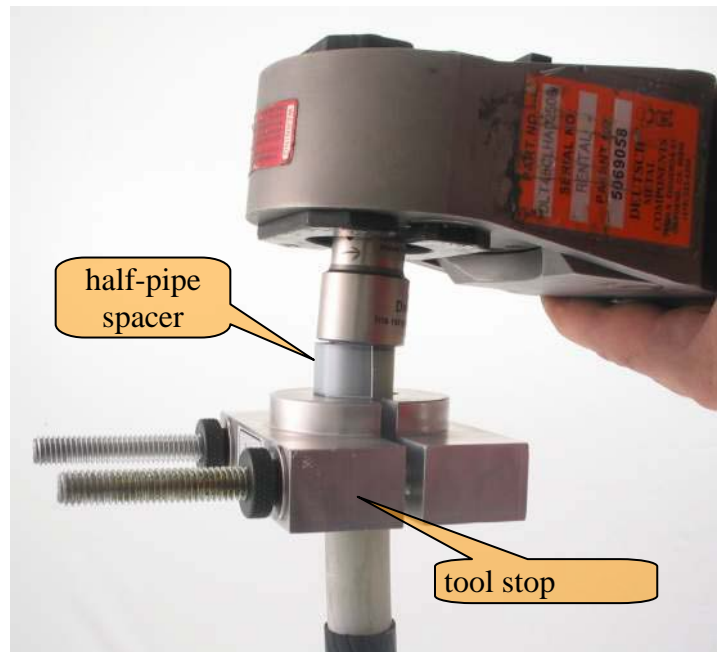


Keep fingers away from the closing portion of die and tool head.

- b. If the NRI 30 IA application table requires a double swage to obtain the optimum compression ratio, apply the second swage over the first swage with the second and smaller die indicated on the IA label.



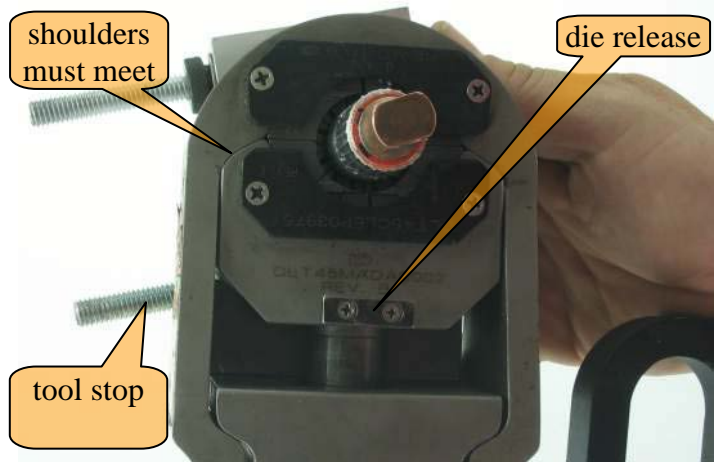
13. Loosen the tool stop knurled knobs and slide the tool onto the insulation. Place the appropriate half-pipe spacer (NPN: 0-LT-HALF-PIPE) on the insulation adjacent to the IA. IA's marked with an "L" will require longer spacers than standard length parts. Snug the tool stop against the half-pipe spacer and tighten the knobs on the tool stop. Remove the half-pipe spacer.



14. Install the 4-digit die which matches the 4-digit number on the insulation side of the IA in the swage head. This 4-digit number is the nominal outside diameter of the IA after it is swaged in mils. A mil is 1/1000th of an inch. In the example, die 0842 will swage to a nominal OD of 0.842".



15. With the die release facing away from the positioning tool, hold the swaging tool head snugly against the tool stop and swage the IA and insulation until the shoulders of the tool meet. Avoid damaging the quick disconnect fitting, if present.



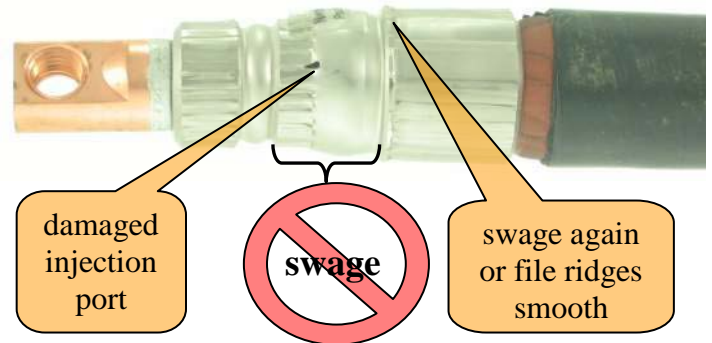
Keep fingers away from closing portion of die and tool head.

16. Rub a 3M[®] Scotch-brite[™] pad around the circumference of the swages to remove any burrs.

17. Additional swages or conventional crimps are applied on the compression barrel before both IA swages are complete. Use manufacturer specified die sizes or an equivalent swage die.



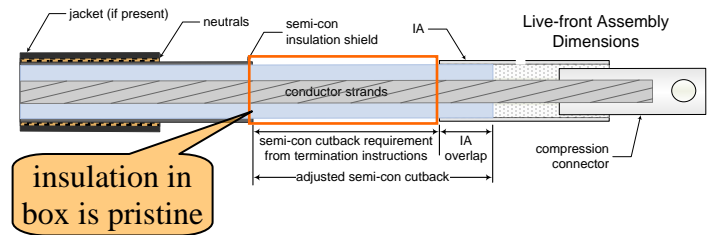
18. IA quality check: If the tools were correctly positioned there should be no marks on the central injection portion of the IA and the entire swage length will be compressed with no ridges at the end margins. Stray swages on the central portion of the IA may interfere with subsequent operation of the injection port. Any rough external edges may be filed or swaged again if necessary. If using a quick disconnect IA, the quick disconnect fitting must be intact.



Quick Disconnect fitting is undamaged



19. Quality check: Refer to the dimensions in step 3-5. Confirm:
- Insulation shield cutback falls within the required range. Adjust if necessary.
 - The exposed insulation length is greater than the semi-con insulation shield cutback requirement from the termination manufacturer's instructions.
 - Exposed insulation is scratch free.
 - If using a quick disconnect fitting, proceed to step 20b. Otherwise, proceed to step 20a.



20. Install the termination:
- After injection is complete and the plug pin is inserted flush with the IA exterior, install the component as per the manufacturer's installation instructions. Silicone grease may be applied to the IA exterior to facilitate the installation of molded components. Avoid applying torque to the IA. The Novinium Certified craftsman who is responsible for the quality of this installation should place his/her "Novinium Certified" sticker (NPN: 1-MI-CRFT-TAG) over the plug pin.

plug pin is flush; if not, gently tap flush with small hammer



- Use a hammer to gently tap a plug pin into the IA. Ensure the pin is flush. Install the component per manufacturer's installation instructions. The responsible craftsman should attach his or her "Novinium Certified" sticker (NPN: 1-MI-CRFT-TAG) over the plug pin. The plug pin must be fully seated, the termination installed, and the craft tag attached prior to attaching the Quick Disconnect Injection Tool or injecting. Remove the Quick disconnect Injection tool when injection is complete.